



INSTITUTO FEDERAL
Ceará

Eletrônica para Informática

Soma_subtração

Portas Lógicas



Adição binária

0 1
H

- Regras:
 - $0 + 0 = 0$
 - $0 + 1 = 1$
 - $1 + 0 = 1$
 - $1 + 1 = 0$ (e "vai 1" para o dígito de ordem superior)
 - $1 + 1 + 1 = 1$ (e "vai 1" para o dígito de ordem superior)



■ Ex: 101 + 011

$$\begin{array}{r} 1 \quad 1 \quad 1 \\ \downarrow \quad \downarrow \quad \downarrow \\ \begin{array}{r} 1 \quad 0 \\ + 0 \quad 1 \\ \hline 1 \quad 0 \end{array} \quad \begin{array}{r} 1_2 \\ 1_2 \\ 0_2 \end{array} \end{array}$$

0 1
├─┤



Subtração binária

0 1
H

- Regras:
 - $0 - 0 = 0$
 - $0 - 1 = 1$ (e "pede emprestado 1" para o dígito de ordem superior)
 - $1 - 0 = 1$
 - $1 - 1 = 0$



- Ex: $101 - 011$

$$\begin{array}{r} 101_2 \\ - 011_2 \\ \hline 010_2 \end{array}$$

0 1
H



Sistema Hexadecimal

$$(F347)_{16} + (E916)_{16} =$$

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

$$\begin{array}{r} (F347)_{16} \\ + (E916)_{16} \\ \hline \end{array}$$



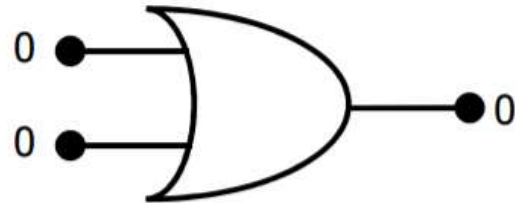
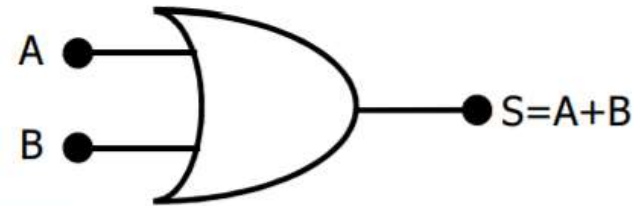
Sistema Hexadecimal

$$(FACA)_{16} - (BABA)_{16} =$$

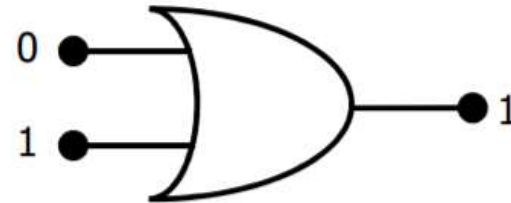
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

$$\begin{array}{r} FACA \\ - BABA \\ \hline \end{array}$$

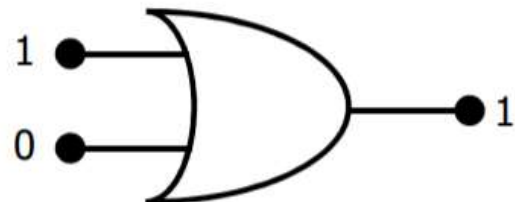
Porta Lógica **OU** (**OR**)



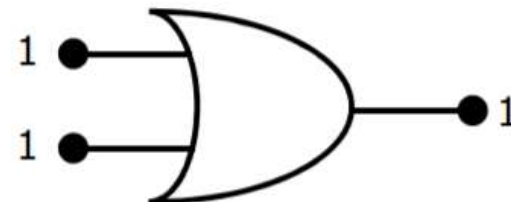
A	B	S=A+B
0	0	0
0	1	1
1	0	1
1	1	1



A	B	S=A+B
0	0	0
0	1	1
1	0	1
1	1	1

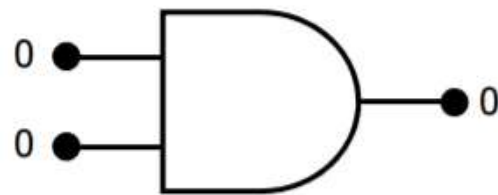
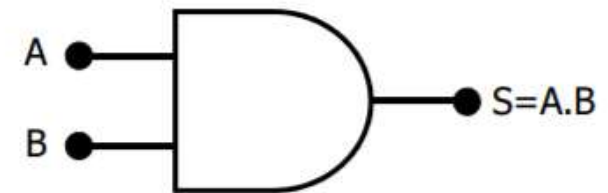


A	B	S=A+B
0	0	0
0	1	1
1	0	1
1	1	1

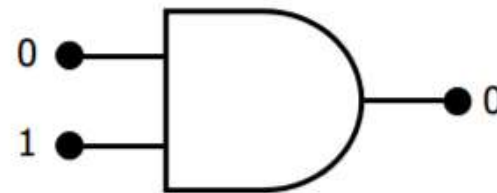


A	B	S=A+B
0	0	0
0	1	1
1	0	1
1	1	1

Porta Lógica **E** (**AND**)



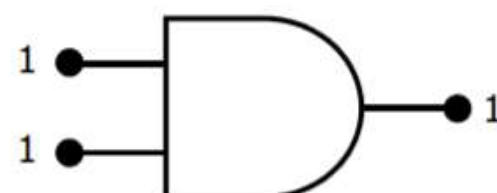
A	B	S=A.B
0	0	0
0	1	0
1	0	0
1	1	1



A	B	S=A.B
0	0	0
0	1	0
1	0	0
1	1	1

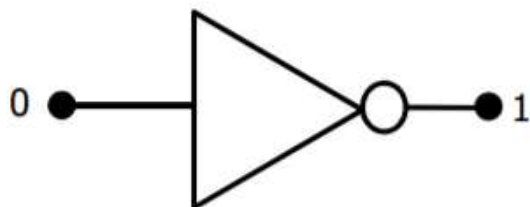
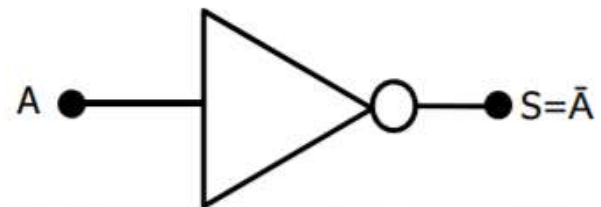


A	B	S=A.B
0	0	0
0	1	0
1	0	0
1	1	1

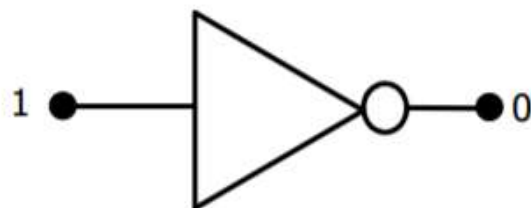


A	B	S=A.B
0	0	0
0	1	0
1	0	0
1	1	1

Porta Lógica **NÃO** (NOT)



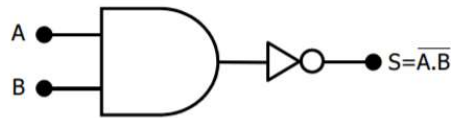
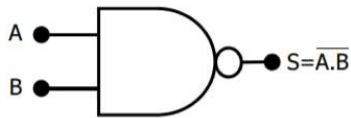
A	$S = \bar{A}$
0	1
1	0



A	$S = \bar{A}$
0	1
1	0

Porta **NÃO E** (NAND)

- A porta **NÃO E** (NE) é o bloco lógico que executa a função **NÃO E**, ou seja, sua tabela verdade
- Representação

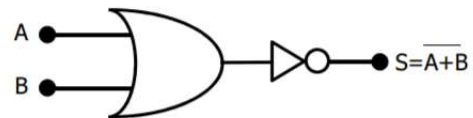
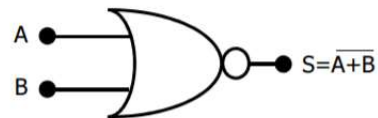


□ Tabela verdade

A	B	$S = \overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

Porta **NÃO OU** (NOR)

- A porta **NÃO OU** (NOR) é o bloco lógico que executa a função **NÃO OU**, ou seja, sua tabela verdade
- Representação



□ Tabela verdade

A	B	$S = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

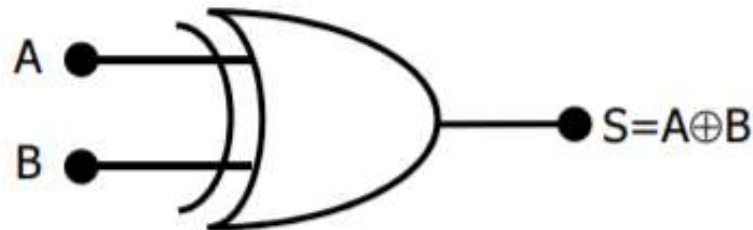
Função **OU Exclusivo** (XOR)

- A função **OU Exclusivo** fornece
 - 1 na saída quando as entradas forem diferentes entre si e
 - 0 caso contrário
- $S = A \oplus B$
 $= \bar{A}.B + A.\bar{B}$

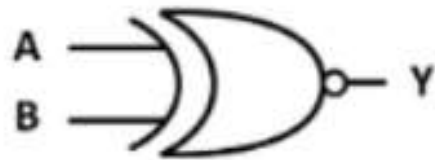
□ Tabela verdade

A	B	$S=A\oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

Simbologia adotada



Porta XNOR



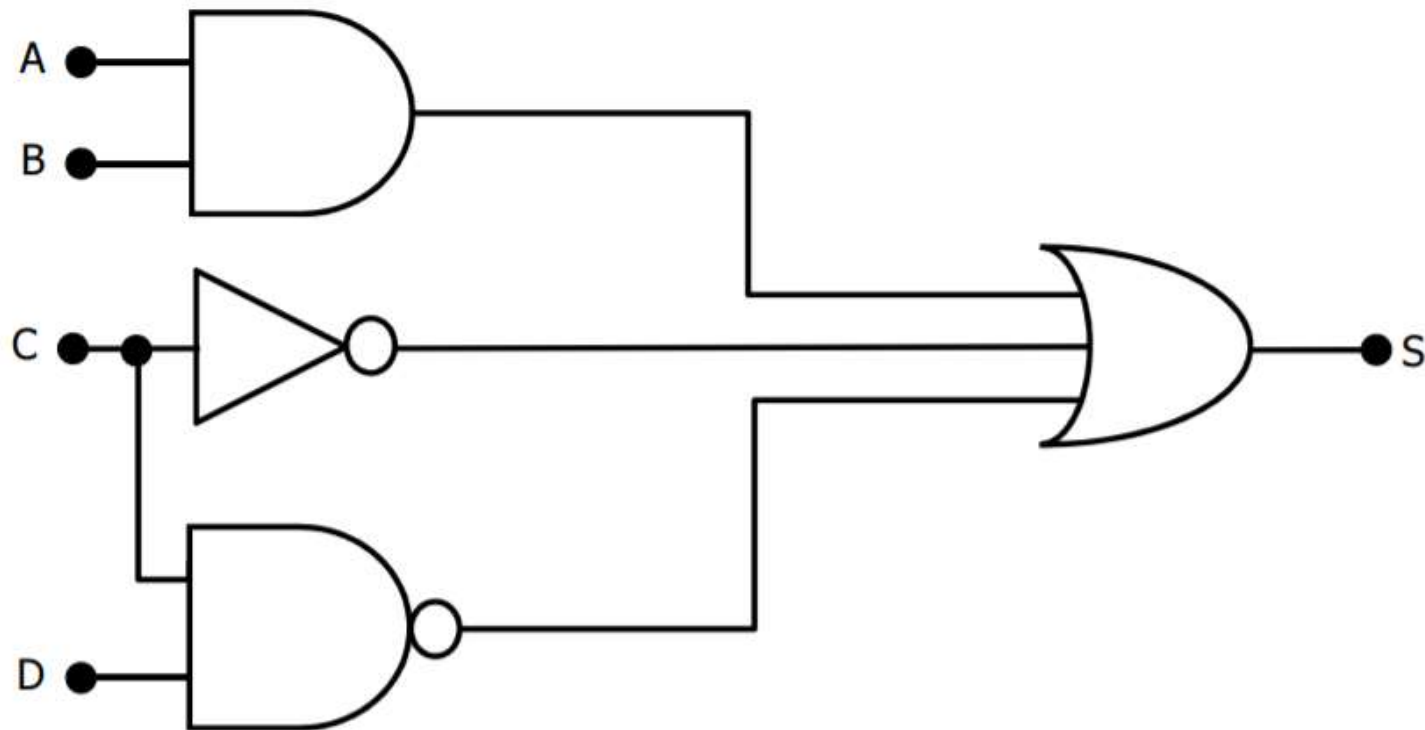
$$Y = \overline{A \oplus B}$$

$$Y = A \odot B$$

Inputs		Output
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

função coincidência

- ❑ Determinar a expressão booleana característica do circuito



□ Desenhe o circuito lógico que executa a seguinte expressão booleana

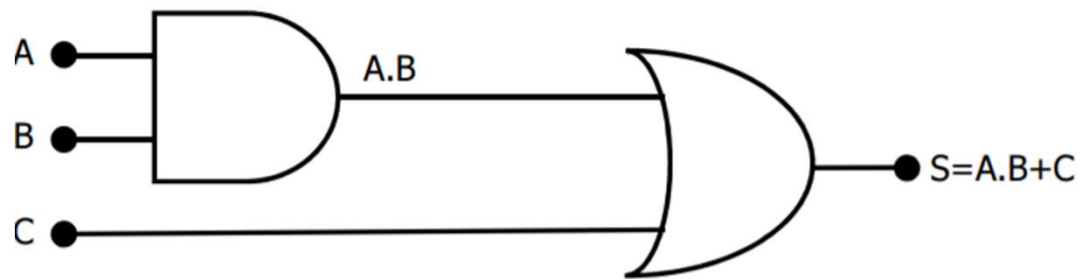
■ $S = (A+B).C.(B+D)$

■ $S = (A.B.C) + (A+B).C$

□ Desenhe o circuito lógico que executa a seguinte expressão booleana

■ $S = (A.B.C) + (A+B).C$

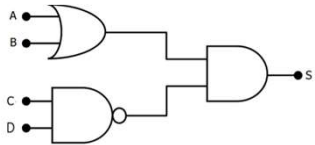
Preencha a Tabela Verdade (TV)



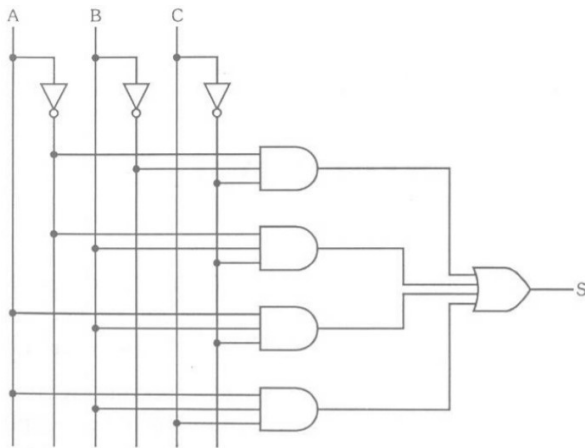
A	B	C	S
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

TAREFA: Resolva de forma manuscrita e envie a resolução ao professor preferencialmente na forma de arquivo .pdf. !

a) Preencha a TV:



b) Preencha a TV:



c) Desenhe o circuito lógico correspondente a expressão abaixo e preencha a TV:

$$y = AC + B\bar{C} + \bar{A}BC$$

TAREFA

d) Realize as seguintes operações:

- $(DBAB)_{16} + (1F2)_{16} =$
- $(F0F1)_{16} - (2FF)_{16} =$
- $(10001111)_2 + (10110011)_2 =$
- $(10101110)_2 - (1111)_2 =$